young shoots of the daisy. . . . Our ants may not perhaps lay up food for the winter (like the harvesters), but they do more, for they keep during six months the eggs which will enable them to procure food during the following summer, a case of prudence unexampled in the animal kingdom."

Only one chapter of the book is devoted to bees, and one other to wasps. These, however, are very interesting, as the following *résumé* will show:—

Numerous observations went to prove "that bees do not bring their friends to share any treasure they have discovered so invariably as might be assumed from the statements of previous writers;" and also that in general bees are rather stupid in finding their way to honey out of rooms, &c. Their affection and sympathy is even less developed than in ants, so that Sir John doubts "whether they are in the least fond of one another." Their special senses are much the same as those of ants, hearing being to all appearance absent, while smell and sight are well developed, the latter enabling the insects to distinguish differences of colour on coloured surfaces. They prefer blue.

All these remarks apply to the experiments on wasps no less than to those on bees, except that they are somewhat more clever in finding their way, and show less preference for certain colours. One individual wasp was tamed, used to perch upon the hand, "apparently expecting to be fed," and even allowed herself to be stroked without any appearance of alarm.

We have now said as much as our space permits to recommend this work to all who take an interest in one of the most interesting branches of natural history. We can only find two points on which to offer criticism. Over a hundred pages are occupied with appendices, conveying minute details of the observations and experiments mentioned in the previous part of the work. These details appear to us unnecessary in a popular book, and we think that the space filled by them might have been more profitably devoted to a well compressed abstract of the observations of other naturalists upon the psychology of the hymenoptera.

The second point, which seems to us fairly open to criticism, is that concerning the author's views on the philosophy of vision. He discusses the theories of vision by simple and compound eyes of insects, and says, "The prevailing opinion of entomologists now is that each facet receives the impression of one pencil of rays; so that, in fact, the image formed by a compound eye is a sort of mosaic," and proceeds to observe that this theory "presents great difficulties," because "those ants which have very few facets must have an extremely imperfect vision," and also because the ants have simple eyes as well as compound, so that, according to the theory, the former cast reversed images, and the latter direct—a consideration which leads Sir John to remark, "that the same animal should see some things directly, and others reversed, and yet obtain definite conceptions of the outer world, would certainly be very remarkable."

Now, as regards the first objection, the perfection or imperfection of the vision would not necessarily be determined by the *number* of the facets any more than by their *size*. If a given area or eye-space is throughout a receptive surface, it need make no difference whether the area is composed of a few facets or of many; the perfection or imperfection of the apparatus as an eye would in either case depend on the distinctness or definition with which a pencil of rays is admitted into each facet, whether the pencil itself be wide or narrow.

And, as regards the second objection, we can see no real difficulty in supposing that the same animal should with some of its eyes see direct images and with others reversed images, without any confusion resulting to its mental perceptions. Let us first consider the case of reversed images. Sir John Lubbock says that we "see everything really reversed, though long practice has given us the right impression." But this statement is not quite correct. We do not really *see* things reversed, for the mind is not a perpendicular object in space standing behind the retina in the manner that a photographer stands behind his camera. To the mind there is no up or down in the retina, except in so far as the retina is in relation to the external world, and this relation can only be determined, not by sight, but by touch. And if only this relation is *constant*, it can make no difference to the mind whether the images are direct, reversed, or thrown at any angle with reference to the horizon; in any case the correlation between sight and touch would be equally easy to establish, and we should always *see* things, not in the position in which they are *thrown upon* the retina, but in that which they occupy *with reference to* the retina. Thus it really requires no more "practice" correctly to interpret inverted images than it does similarly to interpret upright images, and therefore the fact that some eyes of an ant are supposed to throw direct images, while others are supposed to throw reversed, is not any real objection to the theory which Sir John Lubbock is considering.

We give these criticisms as the only ones we have found it possible to make, and heartily wish so interesting a book the success which it deserves.

GEORGE J. ROMANES

OUR BOOK SHELF

The Great Giant Arithmos, a Most Elementary Arithmetic. By Mary Steadman Aldis. (London: Macmillan, 1881.)

"THERE are still mothers who wish to retain some portion of that influence which nature intended them to have in the training of their children, and who refuse to abandon it wholly either to the schoolmaster or the state. To such as these this little book is offered as a help in laying the foundations of one of the most important branches of instruction." In fifty-eight chapters the tender student is led pleasantly, clearly, and thoroughly, from the very simplest notions which lie at the threshold of arithmetic till he (or she), having solved many of the giant's easy riddles, is in a very good position to find out for himself some of the harder ones. We should say that the child who has had this course carefully laid before it, will have had its interest maintained throughout without flagging, for the mode of presenting the subject is such as to excite attention without causing fatigue. The lessons are all short, the questions pointed, and such as to draw out what knowledge has been acquired. Very little more is done than to explain the elementary operations of numeration, addition, subtraction, multiplication, and division. Towards the close a glance is given at some of the giant's more recondite mysteries, as of parts

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or fractions of things. Much useful, if elementary, information is conveyed in small doses as the child is able to receive it, but there is nothing childish in the matter or the manner. We should say that the best way to use the book would be for the parent (or governess) to master each lesson well beforehand, so that there should be little or no reference to the book during lesson-time, except, perhaps, for the purpose of looking at the illustrative drawings. We feel sure that when the "good bye" is reached there will be few to call Arithmos unkind names and say "he is a horrid, cross old thing," and that "they hate him, and wish such a giant had never been made."

A Treatise on Elementary Trigonometry. By the Rev. J. B. Lock. (Macmillan, 1882.)

Introduction to Plane Trigonometry. By the Rev. T. G. Vyvyan. (Deighton, Bell, and Co., 1882.)

BOTH these works are elementary: their scope is in the main limited by the requirements of the Previous Examination at Cambridge, and of the Entrance Examinations for the army. Mr. Lock's is by far the fuller work, and is well adapted for a student who has not constantly at hand the assistance of a private tutor; in fact, such a reader, if of fair intelligence, might be independent of extraneous aid, if he have previously grounded himself carefully in geometry and elementary algebra. The work contains a very large collection of good (and not too hard) examples. The only fault—if we must grumble—is that there is too much, we think, for ordinary school teaching. As Mr. Vyvyan remarks, "in all public schools but a few hours a week can be given to mathematics by the generality of boys," and trigonometry has to take, in general, a very small portion of that limited time. But Mr. Lock is to be congratulated, when so many "Trigonometries" are in the field, on having produced so good a book, for he has not merely availed himself of the labours of his predecessors, but by his treatment of a well-worn subject has invested the study of it with interest. The figures are numerous, and are drawn so that the salient features arrest the eye at once.

Mr. Vyvyan's work also is well adapted to the end he has in view. He aims at producing a book which may fairly be mastered by any schoolboy of average ability, whose sole desire in studying this branch (or any other branch of mathematics) is to satisfy the University examiners in an early stage of residence, that so he may be free to read other subjects, and bid farewell to mathematics.

The matter is clearly, though somewhat concisely put, and is sufficient in quantity for Mr. Vyvyan's purpose, which is not to bring out a book that will render a schoolboy or other junior student independent of the assistance of a master—this he considers to be an impossible task. We ourselves have found that very much explanation is required by the generality of pupils. There is a sufficient collection and variety of exercises.

We cannot say that either text-book will supersede all other text-books, but each merits, and will no doubt secure a very fair circulation in schools. Mr. Lock's being the fuller, is likely to be the more generally acceptable.

An Elementary Treatise on Conic Sections. By Charles Smith, M.A. (London: Macmillan, 1882.)

A THOROUGHLY excellent elementary treatise. For a long time we have been exercised in mind when asked to recommend a book on Conics. To all its predecessors, with their varying shades of goodness and badness, we had some objection or other to urge. Mr. Smith has just met our want; his book is right up to the time, and is admirably adapted for the preparation of pupils for college scholarships; for students at the university it is a fitting introduction to that as yet unapproached work, Salmon's treatise on these curves. The text is excellent, full in alternative proofs, and suggestive in its methods; the numerous worked-out exercises, in addition to those collected at the close of the several chapters, render the reader independent of any other work. We think the title-page should state that it is an "analytical" treatise on conics.

LETTERS TO THE EDITOR

[*The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts. No notice is taken of anonymous communications.*

[*The Editor urgently requests correspondents to keep their letters as short as possible. The pressure on his space is so great that it is impossible otherwise to ensure the appearance even of communications containing interesting and novel facts.*]

The Darwin Memorial

THE note in NATURE, vol. xxvi. p. 87, on the Darwin memorial, says that there is to be a fund associated with the name of the great naturalist, which shall be devoted to the furtherance of biological science. Probably most biologists would agree that one of the best plans for effecting this object would be one, the idea of which originated with Mr. Sydney Hickson, of Downing College, Cambridge, who is at present on the staff of the Oxford Biological Laboratory. This plan is to establish out of the fund a marine zoological station somewhere on the English coast, that of Devonshire, for example. Mr. Hickson has advocated this course in a letter to the *Times*, where he pointed out that Italy, Austria, and France have zoological stations, while we have none, a fact which is one of the many signs that the teachings of Darwin have aroused more enthusiasm and activity abroad than at home. If you would give publicity to this suggestion it would be certain to come under the notice of the Memorial Committee and of biologists generally.

J. T. CUNNINGHAM

Cottons, Romford, May 27

Comet *α* 1882

OWING to recent bad weather, the only opportunity we have had here of observing the spectrum of the comet was on June 4. Unfortunately our view was obstructed by clouds just as it grew dusk, but at 11.30 I managed to obtain a glimpse for a few moments. The nucleus gave a very bright continuous spectrum, with a marked increase of luminosity and widening of the spectrum in the yellow. I could see no lines or bands. I was not able to make any further observations, as the comet was on the point of disappearing behind a tree.

A. PERCY SMITH

Temple Observatory, Rugby, June 6

THIS comet was distinctly visible to the naked eye, at 11 p.m. on Sunday, June 4, in the north-west, about 5° to 10° above the horizon (being in a hilly country, I could not estimate it correctly), with a bright nucleus, and a tail about 1½° in length. The sky had been overcast and stormy all day, but cleared up before midnight. I observed it from a hill-side about 400 feet above sea-level.

F. T. MOTT

Leicester

Meteors

ABSENCE from home on business connected with the Transit of Venus Expeditions prevented me sending you earlier notice of a very brilliant meteor, which was seen here and at several distant stations.

On May 4, at 9h. 31m. p.m., Mr. Rooney, one of the assistants of the Observatory, saw a large fire-ball of a light purple tint. It was first observed near the star Arcturus, and then it moved towards the Great Bear, passing between δ and ε Ursæ. It burst just under α Ursæ, when its train changed in colour from a purple tint into a brilliant red. It was visible for about five seconds, and lit up the whole garden.

Another assistant, Mr. Cullen, saw the same body from a place not far distant, and his account agreed well with the above.

A note from a friend at Clitheroe informs me that the meteor was seen in that town by several persons, and was as brilliant as the full moon.

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